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HALOGETON

Death losses of livestock by halogeton poisoning has been recognized as a serious problem on western rangelands for more than twenty years. Halogeton is still causing some occasional heavy losses of domestic livestock even though we now have the knowledge and experience to prevent these losses. This paper is offered as a review of the halogeton problem and to list suggestions to aid in reducing livestock losses from the plant.

Research

It is conservatively estimated that $2 million has been spent in the last 15 years by various agencies and institutions on halogeton research. Approximately three dozen publications have been issued as a result of these efforts. Research has included studies on life cycle, seed longevity and viability, management aspects, and methods of control such as chemical, biological, burning, and providing vegetative competition. Studies are somewhat limited at present, but some research is still being conducted on seed longevity, biological control, chemical control and developing competition through revegetation by reseeding and/or grazing management.

Description

Halogeton is a succulent annual that somewhat resembles Russian thistle in growth habit. The bluish-green, sausage-shaped leaves are 1/8 to 1/2 inch long with a tiny stiff hair (1/12 inch long) on the tip of each leaf (12).1/ Large plants may measure three feet across and weigh over seven pounds, whereas other plants may measure only an inch or two across (2). Size depends on a variety of factors such as site productivity, yearly variations in climate, and amount of competition.

Halogeton is a halophyte. It thrives in saline and alkaline soils but is adaptable to a variety of edaphic, topographic, and climatic conditions. It quickly spreads wherever natural vegetation is disturbed enough to give it a foothold and offer little competition.

1/ Numbers in parenthesis refer to literature cited, p. 6 & 7.

Dense stands are found on burned-over areas, overgrazed ranges, dry lake beds, abandoned farm lands, railroad beds, road margins and sheep trails. It will take root on rodent and ant hills, salt grounds and areas where the soil is washed and gullied by erosion (1, 2, 9, 12).

Halogeton is a prolific seeder and produces two types of seed. (a) A brown seed (named for the color of the bracts which cling to the seed) is produced first. This type is largely dormant and may lie in the soil for several years before germinating. (b) A black seed (named for the color of the seed coat) which does not persist in the soil for more than one season and which may germinate soon after the plant matures. Most of the black seed has fallen to the ground by late October or early November, but the brown seed may remain on the plant until January or February (5).

Individual plants may produce up to 50,000 seeds and dense stands yield up to 500 pounds of seed per acre (9). Viable seed has been produced by mature plants which were only 3 inches tall (12). Seeds begin germinating late in the winter and new seedlings appear after each heavy rain throughout the summer (1, 9, 11, 12). Plants that start growth in August may produce a seed crop in November (1) if conditions are right.

Poisonous Properties

Sodium and potassium oxalates are the toxic properties of halogeton (1, 2, 5, 12). They occur as both insoluble and soluble forms in the plant. Insoluble oxalates are non-toxic, since, when consumed, they are excreted in the feces (8). Soluble oxalates may be toxic, and when consumed they can (a) combine with calcium, form calcium oxalate and be excreted in the feces, (b) be absorbed into the blood stream, combine with blood calcium and form calcium oxalate which is deposited in the kidney and interferes with its function, or (c) the rumen micro-organisms may destroy the oxalate. The micro-organisms must become accustomed to the oxalate before they can destroy it in large quantities (8).

Oxalates usually do not make up more than 10 to 17% of a halogeton plant, however this figure may be as high as 30% (8). The amount of plant material required for a lethal dosage depends on (8, 9): (a) the quantity of oxalates present and the moisture content of the plants when consumed, (b) fill of the animal, (c) state of nutrition of the animal, and (d) previous exposure of the animal to plants containing oxalates.

Generally, a much greater volume of plant material would have to be consumed in the summer than in the winter to obtain the same amount of oxalates. This is due to the high moisture content of green plants in the summer.

Studies have shown that (10) the leaf, fruiting bract, and seed portions of the plant contain most of the oxalates, and most livestock losses from halogeton poisoning have occurred during the fall and early winter when these parts are abundant on the plant. Also, since the plants are drier at this time of year than during the green period, more oxalates are consumed when the same amount of plant material is eaten.

It is important to remember that the growth form of halogeton is somewhat affected by site and the plant grows in a more or less prostrate form in some localities. When this occurs, the leaves and seeds may not readily be knocked from the plant by weathering and therefore plant toxicity may remain high until early spring. Also, the amount of feed eaten by a grazing animal is controlled to some extent by water intake, since less forage is consumed if adequate water is not available. The danger of poisoning can be high if thirsty and hungry animals are watered (8). They will immediately want to graze and if a stand of halogeton is present, the results can be disastrous.

Symptoms of Poisoning

Halogeton is primarily poisonous to sheep but some heavy losses of cattle have been recorded. Early symptoms of poisoning include dullness, loss of appetite, lowering of the head, and reluctance to follow the band. Advanced symptoms include drooling and white froth about the mouth, nasal discharge, progressive weakening, rapid and shallow breathing and coma (1).

Control of Halogeton

Because the weed is so widespread, eradication is not considered feasible, except on isolated spot infestations. Recommended control measures include: (a) revegetation of infested areas, (b) biological control by grazing management or by introduction of insects or other parasitic organisms, and (c) chemical control. A combination of these methods will probably prove to be the most effective (5).

Control by Revegetation.

Planting crested wheatgrass or other adaptable forage species has proved successful in providing competition to halogeton on some sites. However, the salt tolerance of halogeton and the lack of tolerance of crested wheatgrass prevents halogeton control on saline and alkaline soils by this method (9).

The possibility of cross breeding or selective breeding of halogeton to eliminate its poisonous oxalates has been considered. Although it might be relatively simple to breed the poison out of halogeton, it would be more difficult, if not impossible, to establish this plant on the range, particularly to replace present halogeton plants. In all probability animals would not be able to detect the difference and would still consume the poisonous plants.

More profitable efforts and funds could be devoted to exploration and breeding of other more palatable forbs and grasses which could tolerate the environment in which halogeton grows. This approach is entirely feasible.

Biological Control

Halogeton thrives in the salty soils of semiarid regions (1), but under proper grazing management, perennial shrubs and grasses can recover and replace annual weeds on these areas. Although recovery of perennial shrubs and grasses is slow, improved grazing management has effectively reduced livestock losses to the weed (5).

Halogeton is not a problem in its native home of Russia. The insects associated with the weed at home are thought to be at least part of the reason for this. The Agricultural Research Service is conducting explorations for insects that will selectively feed on halogeton. Some promising insects are presently under quarantine in California where ARS is continuing to study their life histories and habits. 2/

Chemical Control

Control of halogeton with presently recommended chemicals is expensive, and control problems vary with local circumstances. If chemical control is determined to be feasible on an isolated spot infestation or high value site, it may require one or more treatments, one or more kinds of chemical, but it will always require (11) that:

1. The first and all follow-up treatments be applied at the proper time.
2. Every plant be treated completely and uniformly.
3. Enough of the right chemical be used.
4. Rechecks be made of all work to see if all plants were killed and to determine whether any new plants have germinated since treatment.

The most widely recommended chemical is a low-volative ester of 2,4-D at two pounds acid equivalent per acre diluted in 15-20 gallons of water. Time of chemical application should be based on physiological stage of development rather than chronological age of the plant (5). The susceptibility of halogeton to 2,4-D drops off rapidly when the plant enters its reproductive phase of growth. Susceptibility then continues to decrease for the rest of the growing season (5, 9).

2/ Personal correspondence with Lloyd A. Andres, Leader, Biological Control of Weeds Investigations, Entomology Research Division, A.R.S., Albany, California.

Prevention of Poisoning

Halogeton is probably here to stay but the threat of livestock poisoning can be reduced to a minimum if rangelands are managed wisely. Sheep and cattle ranchers will have to learn to live with the plant and conduct their operations on land where it is present in the same manner as they have learned to operate with other poisonous range plants (2). The following practices are suggested to aid ranchers prevent halogeton poisoning in livestock.

1. Introduce animals to infested areas slowly, giving the rumen micro-organisms time to become accustomed to the oxalate and to develop the ability to destroy it (8).

2. Trail animals slowly and openly so they may select the more palatable and harmless forage.

3. Feed alfalfa or calcium fortified pellets when trailing through or grazing halogeton infested areas. Dicalcium phosphate is one of the more effective sources of calcium. This supplementing is especially helpful when animals are under stress, such as when trailing, trucking, shearing, etc. (8). Do not feed calcium over extended periods.

4. Keep the animal in a good state of nutrition to avoid nutritional deficiencies that could cause an abnormal appetite (8).

5. Avoid at all times grazing areas heavily infested with halogeton, especially in the fall when plants are heavily laden with seed.

6. Follow range management and/or improvement practices aimed to prevent further spread of the plant and relieve the grazing burden on infested ranges so that native forage plants can gain vigor and crowd out halogeton (1, 5, 8, 12). Light grazing also decreased the likelihood that animals will consume lethal doses of the weed since native forage plants are preferred to halogeton.

7. Supply adequate water to livestock to prevent depression of feed intake. After watering animals, take care to prevent them from eating undesirable forage especially if they are hungry. It may be necessary to provide supplemental feed and/or haul water (8).

8. Try to keep animals from becoming overly hungry when grazing halogeton-infested range, especially when trailing or after being transported for long distances (8). Hungry animals are not as selective as non-hungry animals in what they eat.

Other Considerations

Probably the most significant aspect of halogeton invasion at the present time is livestock poisoning. However, other unfavorable features of the plant also deserve serious consideration. For instance, halogeton can serve as a summer host plant for beet leafhoppers, the carrier of curly top virus in sugar beets (2). In addition, halogeton may adversely affect soil properties through deposition of leachates. One study (7), conducted over a seven-year period under field conditions, indicated that soil changes, over that period of time, were not severe enough to limit growth of other plants. The study did show, however, that there was a definite tendency for adverse soil effects to become cumulative. Alteration of the chemical and physical properties of the soil can affect plant-soil relations in the following ways: increase soluble salts, increase osmotic pressure, block the nitrogen cycle, change the specific ion effect, encourage crusting, reduce percolation and capillary rise of water, and increase runoff and erosion.

Following is a list of literature cited in this paper, plus a few of the many other publications that may be of interest for future reference:

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